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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,959	03/10/2004	Miao-Cheng Liao	67,200-1155	7717

7590 07/12/2006

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EXAMINER	
TRAN, LONG K	

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 07/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/798,959	LIAO ET AL.	
	Examiner	Art Unit	
	Long K. Tran	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *25-34 and 36-58* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *34,36-42 and 48-58* is/are allowed.

6)☒ Claim(s) *25,26,29-33,43,44,47* is/are rejected.

7)☒ Claim(s) *27,28,45 and 46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims **25, 26, 30, 33, 43, 44** and **46** are rejected under 35 U.S.C. 102(e) as being anticipated by Matsuhashi (US Patent No. 6,759,703).

3. Regarding claims **25, 26, 30** and **33**, Matsuhashi, figure 1, discloses an MIM capacitor structure comprising a protection layer ((18a), (18b), (18c)) to prevent inter-diffusion of electrode metal and capacitor dielectric material (column 4, lines 50 – 67):

a bottom non-oxide conductive electrode (17) comprising Cu (column 3, line 35);

a first protection layer (18b) on the bottom conductive electrode (17);

a SiO_2 dielectric layer (20) on the first protection layer (column 3, line 61);

an upper non-oxide conductive electrode (21) on the dielectric layer (20) comprising Cu (column 4, line 63); and

a second protection layer (18c) disposed between dielectric layer (20) and the upper conductive electrode (21).

Note that Matsuhashi discloses the dielectric layer (20) comprising a CVD silicon oxide (column 6, lines 43 – 44) but does not teach the dielectric layer (20) comprising a

PECVD silicon oxide as cited in claim 30. However the respective limitations (PECVD) are taken to be a product by process limitation and considered non-limitations. In the product by process claim, it is the patentability product and not of recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324,326(CCPA 1974); In re Marosi et al., 218 USPQ 289,292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process " claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not. Note that applicant has the burden of proof in such cases, as the above case-law makes clear.

Regarding to claims **43** and **44**, Matsuhashi discloses the first and the second protection layer comprising TiN or TaN (column 3, line42 – 53) having a higher density including refractive index then SiO_2 or SiN dielectric layer.

Regarding claim **47**, Matsuhashi discloses the bottom electrode (17) and the first protection layer (18b) having a wider dimension compared to the upper electrode and second protection layer (18c).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim **29** is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuhashi (US Patent No. 6,759,703) in view of Huang et al. (US Patent No. 6,916,722).

6. Regarding claim **29**, Matsuhashi discloses the claimed invention of claim 25 except for an uppermost portion of the bottom and upper conductive electrodes comprise a material selected from the group consisting of Ta, TaN, and TaSiN. However, Ta and TaN are known materials in semiconductor art for forming bottom and top electrodes of a MIM capacitor as taught by Huang (column 5, lines 56 – 59).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a well known Ta and TaN as shown by Huang for forming the uppermost portion of the bottom and upper conductive electrodes of Shimizu MIM capacitor in order to improve performance of capacitance voltage linearity (column 5, lines 56 – 59).

7. Claims **31** and **32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuhashi (US Patent No. 6,759,703) in view of remark.

Regarding claims **31** and **32**, Shimizu discloses the claimed invention of claim 25 and 26 respectively and also teaches the thickness variation of protection layers would

not change the capacity of the capacitor (column 6, lines 60 – 65) but fails to teach the first and second protection layers are formed having thickness between about 25 Ã to about 200 Ã.

However, it would have been well known in the art that the selection of those parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, or in combination of the parameters would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

Moreover, the thickness of the protection layers layer has not been alleged by applicant to be of significant importance for patentability.

Allowable Subject Matter

8. Claims **27, 28, 45** and **46** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. Claims **34, 36 – 42** and **48 – 58** are allowed.

10. The following is an examiner's statement of reasons for the indication of allowable subject matter: Claims **27, 28, 34, 36 – 42, 45, 46** and **48 – 58** are allowable over the prior art of record because none of the prior art whether taken singularly or in combination, especially when these limitations are considered within the specific combination claimed, to teach:

A bottom protection layer comprising (nitrogen containing) silicon rich oxide on a bottom conductive electrode and a top protection layer on an oxide dielectric layer, wherein the protection layers have a relatively higher silicon content compared to stoichiometric SiO_2 as cited in dependent claims (27, 28, 46 and 47) and independent claims 34 and 51; and among other limitations cited in the independent claims 34 and 51.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey or Matthew Smith can be reached on 571-272-1835 or 571-

272-1907 (Smith). The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LKT

July 7, 2006